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Awareness and Understanding of Deepfakes Among University Students in Bangladesh

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Abstract:

The recent rise of deepfake technology has raised global concerns, extending to Bangladesh. This generative artificial intelligence-based technology is being used with the intention of disseminating political misinformation, spreading hatred, and targeting women to cause them harm. This creates serious concerns for society by threatening peace, democracy, harmony. The current study investigated the extent to which the youth population of Bangladesh are aware of deepfakes. It explored the level of media literacy among them and their ability to discern between genuine and manipulated content. Methodologically, the study employed surveys using a set of questionnaires of 19 questions. The survey data revealed that a substantial majority of respondents had prior knowledge of the term "deepfake," but there still is a notable percentage of respondents who have never heard of deepfakes, suggesting the existence of a knowledge gap. Data also suggested that many students lacked a formal introduction to deepfake and its possible implications and consequences for society, compounded by the perception among some that deepfakes are merely a form of entertainment. Massive educational campaigns in schools, colleges, and universities came out as the most prominent strategy for combating deepfake technology, followed by educational program, workshops and seminars.

Keywords: Deepfake, Media Literacy, Deepfake Awareness, Youth population, Deepfake in Bangladesh, Generative Artificial Intelligence

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1. Introduction:

Social networks serve as effective platforms where users' ideas spread in an easy and efficient way (Alkiviadou, 2019). Platforms like Facebook, Twitter, Instagram, Reddit, and YouTube have facilitated a space where they can share everything, ranging from personal feelings, experiences, creative works to professional communication materials like news, formal statements from organizations and institutions. Images, audio, video materials are common forms of shared content. On the other hand, there is generative artificial intelligence that enables humans to produce contents like audio, image, text, videos that are fake but very persuasive for the human eye to believe. Experts are calling them with different names such deepfakes, synthetic media, visual disinformation, manipulated content, artificial intelligence generated content etc. This democratic opportunity of content generation and platforms for sharing those contents have led to a very complex era of misinformation/disinformation.

This recent surge in deepfake technology has raised global concerns (Young, 2021). This technology is now accessible to anyone with minimal expertise and has been increasingly utilized for disseminating political disinformation (Vaccari & Chadwick, 2020) and circulating nonconsensual synthetic content, thereby undermining trust, privacy and destabilizing societal norms. Particularly alarming is the targeting of women for deepfake pornography, raising significant concerns regarding their privacy and dignity (Hao, 2021). Research company Sensity AI showed in its records from 2018 to 2020 that between 90% and 95% of deepfakes are non-consensual porn, with about 90% of that being non-consensual porn of women.

Additionally, they facilitate fraudulent activities, perpetrate scams, and manipulate innocent individuals through blackmail (Mirsky & Lee, 2021). Incidents of defamation, misinformation, disinformation, and social engineering attacks have surged too (Vijayan, 2022), underscoring the severe societal implications of deepfake technology. The cases of deepfakes are rapidly increasing according to the report of Sensity AI. The following figure in their report shows how much deepfake content increased over the years.

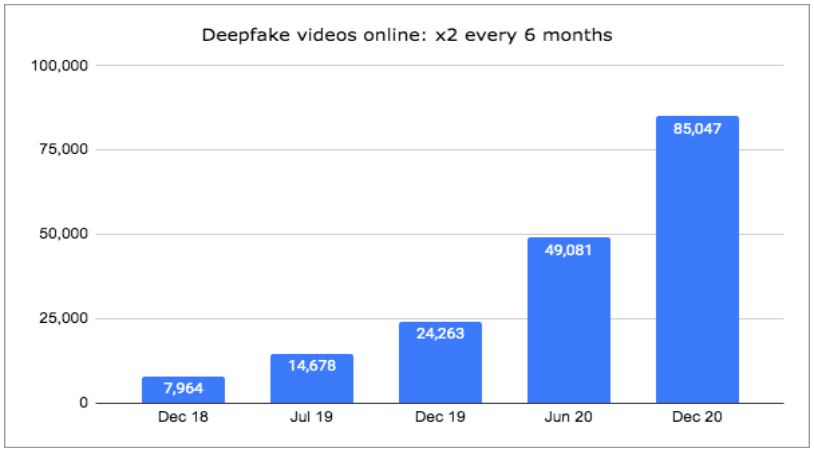

Figure 1: Frequency of deepfake videos released online (Source: Sensity AI)

Sensity AI detected 85,047 fake videos starting from December 2018 till December 2020. The graph above shows that every six years the number of found cases doubled. According to the Global Risk Report 2024 published by the World Economic Forum (presented in figure 2), artificial intelligence-generated misinformation and disinformation are seen as the second most severe risk factor in the world.

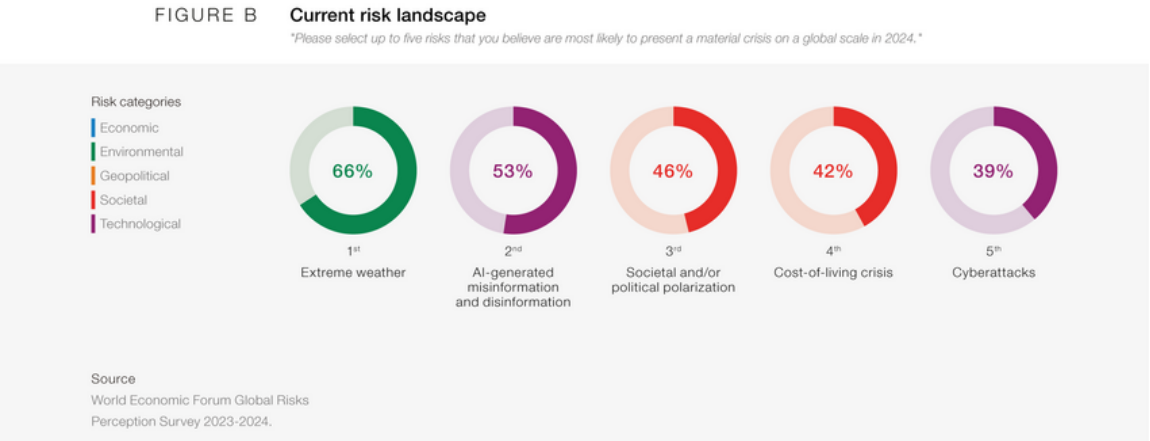

Figure 2: Current risk landscape on global perspective (Source: Global Risk Report 2024)

As it is a global threat, Bangladesh is no exception to that. Recent cases of deepfakes here span from political disinformation to nonconsensual pornography of women. Students, with their ability to quickly adapt to new technologies make them vital in the fight against cyber threats like deepfakes. If they are aware and have sufficient knowledge and skills in detecting deepfake, they can safeguard themselves and others by remaining vigilant against

this malicious content and thus defend democracy, trust, peace, harmony, and unity in society. Against this backdrop, the current study aimed to investigate the extent to which the undergrade students at various universities of Bangladesh are aware of deepfakes. It also explores the level of media literacy among them and their ability to discern between genuine and manipulated content. Understanding their perspectives is crucial for addressing issues like this in guiding policy making.

2. Objectives of the Study:

The central objective of the current study is to comprehensively investigate the awareness, perception, and media literacy of the youth population in Bangladesh regarding deepfake technology. By doing so, the study aims to address the current academic gap of knowledge regarding deepfake technology in the context of Bangladesh. Moreover, findings of this study also aim to enhance digital literacy and awareness at the individual level as media literacy plays a crucial role in empowering individuals to critically evaluate and navigate the vast array of information disseminated through media channels. Additionally, the research aims to provide insights that are relevant to policymakers and stakeholders involved in addressing the challenges posed by deepfake technology. By elucidating public awareness, concerns, and media literacy gaps related to deepfake content, the study aims to inform the development of targeted policies and interventions aimed at mitigating the negative impacts of deepfake technology.

Research questions:

The aim of this study was to investigate various aspects of awareness, perception, exposure, and attitudes towards deepfake technology among university students. The central research questions are: 1. what are the levels of awareness and understanding of deepfake technology among university students, and how do they perceive its implications for society and personal security?; 2. to what extent do individuals possess knowledge about deepfake creation, detection, and dissemination, and how confident are they in their ability to distinguish between deepfake and authentic content?; 3. Who are the groups the university students think are vulnerable to the spread of deepfakes; and 4. what are the prevailing attitudes towards deepfake technology, including perceptions of its ethical implications, societal risks, and preferred strategies for addressing these challenges?

3. Literature Review:

This Literature review section is articulated in four sections. Part 4.1 explains the concept of deepfake and deepfake technology, part 4.2 highlights demography of youth in

Bangladesh, part 4.3 the recent deepfake cases reported in Bangladeshi media and part 4.4 highlights findings of some of the previous research studies in the area.

4.1 Deepfake and deepfake technology: Artificial Intelligence (AI) has enabled the mass creation of deepfakes (Vaccari & Chadwick, 2020). The two words, 'deep' and 'fake' are self-explanatory. 'Deep' refers to a deep learning technology and 'Fake' refers to a content which is not real or authentic. Deepfake contents can be images, audio recordings, videos etc. and they are usually produced without the consent of the person whose face, voice or video is being digitally altered with an intention to disseminate misinformation, facilitate fraudulent activities, engage in scams, and extort individuals who are not guilty (Frankovits & Mirsky, 2023). For example, in the context of face manipulation, many of the aspects can be altered, such as age, gender, ethnicity, attractiveness, skin color, hair color, style, eyeglass, makeup, mustache, emotion, beard, pose, gaze, mouth open or closed, eye color, injury and effects of drug use (Akhtar, Dasgupta, & Banerjee, 2019). There are applications by which one can easily make such kinds of contents, for example- Deepfake web, Face Swap Live, FaceApp, ZAO, AgingBooth, Soundforge etc. Even the recently announced but not released application 'SORA' from OpenAI completely altered the concept of video production. Their AI generated videos using simple text as prompts are very realistic and eye deceiving.

Deep neural network models such as Generative Adversarial Networks (GAN) technology (Gamage et al., 2022) are used to create such content. Initially GAN was introduced by Google researcher Ian Goodfellow and his colleagues in 2014 (Chesney & Citron, 2019), which is a class of machine learning frameworks (Aggarwal, et al., 2021), to generate hyper-realistic 'synthetic media' (Witness, 2018). This kind of synthetic media content is often indistinguishable from authentic content. The GAN technology consists of two neural networks: a generator and a discriminator. The generator synthesizes fake media samples, while the discriminator evaluates their authenticity. Through iterative training, the generator learns to produce increasingly realistic outputs, aiming to deceive the discriminator. This adversarial training process enables the generation of high-fidelity deepfake content.

In 2017, a video circulated on the Internet showing famous Israeli born Hollywood actress Gal Gadot's face superimposed onto a pornographic video. Even though it was fake, the quality was so realistic that some people believed it was real. The video's creator, known as "deepfakes" on social media platform Reddit, claimed responsibility for that content. The term "deepfake" was coined in 2017 by this Reddit user, who used deep learning to swap celebrity faces onto pornographic videos (Maddocks, 2020). Ever since that, the

quality of this kind of content created by deepfake technology is improving and getting more sophisticated. It is becoming harder to identify whether they are real or fake.

4.2 Demography of the youth in Bangladesh: Bangladesh is undergoing a demographic shift, with an increasing number in the youth population. Recent census data reveals that approximately one-fourth of Bangladesh's total population, falls within the 15-29 age group, amounting to an estimated 45.9 million youths [Bangladesh Bureau of Statistics (BBS) Census Report 2022]. Compared with the 2011 census, the percentage of young people increased from 26 percent to 27 percent.

However, despite the youth bulge, there are concerns regarding the digital literacy levels among them. According to a report published in The New Age, 84.9 percent of young people in Bangladesh lack essential digital skills, positioning the country behind Bhutan, Sri Lanka, and India in South Asia. This underscores the urgent need for efforts to enhance digital literacy among the youth. It becomes an even bigger concern in this era of deepfake technology, misinformation, and disinformation. The deficiency in digital skills among typically tech-savvy section of the population not only hampers their ability to discern credible information from fabricated content but also leaves them vulnerable to exploitation and manipulation in the digital landscape. Previous studies on deepfakes and youth recommend that deepfake education needs to be integrated into educational curricula, along with nurturing critical thinking and digital agency (Naffi, 2023). Their participation in the fight against malicious deepfakes in digital spaces is very crucial.

4.3 Deepfake Cases in Bangladeshi Media: This section highlights the recent instances of deepfakes reported in Bangladeshi newspapers, highlighting their implications and the challenges they pose for various sectors of society. In a report published by Fact Watch on January 8, 2024, it was disclosed that a deepfake video targeting the Head of Detective Branch of the Bangladesh Police had surfaced on social media platforms. The fabricated video depicted the official commenting on political matters, specifically regarding the current Prime Minister and the National Election that took place in January 2024. This incident underscores the vulnerability of public figures to manipulation through synthetic media, raising concerns about the potential for disinformation dissemination which can create public distrust and chaos. Another case, as reported by The Daily Star on January 7, 2024, involved a deepfake video targeting an independent candidate for the Gaibandha-1 seat in the National Election 2024. The video, disseminated on Facebook, falsely portrayed the candidate announcing her withdrawal from the election. Later, verification conducted by Dismislab confirmed the video's artificial origin, emphasizing the need to address

deepfake content to preserve the integrity of political processes and combat disinformation. Furthermore, Prothom Alo's report on January 14, 2024, highlighted the victimization of a prominent Bangladeshi actress by deepfake technology. Fake pornographic videos were created using the actress's Face, underscoring the ethical and legal ramifications of such misuse.

In addition to political and entertainment spheres, deepfake technology has also been employed to propagate false narratives. The Daily Star reported in September 2023 an instance where a deepfake video, disseminated on Twitter by BD Politico, implicated US diplomats in Bangladesh political violence. Similarly, anti-opposition deepfake videos surfaced on Meta's Facebook, including one falsely attributing statement to an exiled leader regarding international affairs. Investigations by 'The Tech Global Institute' and media non-profit 'Witness' concluded these videos were AI-generated, highlighting the challenge of discerning genuine from manipulated content in the digital age. Such content can threaten a country's international security and diplomatic relationship with other countries. These cases underscore the multifaceted impact of deepfake technology on Bangladeshi society, spanning political, social, and ethical dimensions.

4.4 Findings of the previous research: Deepfakes are a new emerging generation of digital disinformation (Byman et al., 2023). As the deepfake phenomenon is new, communication researchers are investigating its possible implications. For example, Jin et al. (2023) found that high definition deepfakes are more efficient at deceiving viewers. Additionally, the number of the source's followers and the video's popularity are positively linked with the content's perceived credibility (Jin et al., 2023).

Vaccari and Chadwick (2020) discovered that exposure to deepfake videos on social media significantly increased uncertainty and diminished trust in news sources. Their study also highlighted the propensity for deepfakes to induce uncertainty among users and erode overall trust in social media news (Vaccari & Chadwick, 2020). Ahmed (2020), and Thaw et al. (2020) found that ordinary individuals struggled to distinguish between authentic and deepfake videos. Additionally, Simonite (2020) and Raj (2020) observed that deepfakes have blurred the lines of truth, contributing to a post-truth environment. Smith and Mansted (2020) highlight the use of deepfake technology in propaganda and misinformation campaigns, particularly in regions with fragile governance and ethnic tensions.

However, a few research studies involving surveys on the young generation to see how they perceive deepfakes were also found. In their research titled "Perception of Deepfake Technology: The Influence of Recipients' Affinity for Technology on the Perception of Deepfakes", Kleine (2022) found that participants with a higher affinity for technology had more background knowledge of the topic, were more impressed by deepfake technology,

and tended to perceive the term "deepfake" less negatively (Kleine, 2022). Another research titled 'Audio Deepfake Perceptions in College Going Populations' by Watson et. al., (2021) found that the presence of a political connotation in an audio deepfake clip can significantly influence individuals' perceptions of its authenticity, regardless of content similarity, while also examining the impact of students' backgrounds and majors on their perception of deepfakes (Watson et. al., 2021).

The literature indicates that deepfakes underscore their potential to deceive and that there are several factors in such content that might lead young individuals to perceive them as authentic, highlighting the complex challenges posed by this emerging technology.

4. Methodology:

The study focuses on the young generation, particularly students from universities, due to their tech-savvy nature, early technology adoption, and engagement with online platforms. The survey method was used as the primary research approach due to its ability to efficiently collect data from a large sample size within a defined timeframe. A structured questionnaire was developed to gather quantitative data on participants' perceptions, attitudes, and awareness regarding deepfake. The questionnaire of 19 questions was designed to be comprehensive yet concise, covering key dimensions relevant to the research objectives. A total of 203 respondents participated in the survey, comprising students from diverse academic disciplines across public and private universities of Bangladesh. Participants were recruited through purposive sampling, leveraging existing networks within university communities and online platforms. The survey data was collected using google form and was analyzed using statistical software Microsoft excel to visualize the data. While collecting data, this study adhered to ethical principles, including informed consent, confidentiality, and voluntary participation. Participants were provided with clear information about the purpose of the study, their rights as research samples, and the handling of their data. All data collected were anonymized to ensure participant privacy and confidentiality.

5. Data presentation:

The findings of this research are presented in five different sections and they are- 1. Profile of the respondents, 2. Source and type of deepfake contents, 3. Deepfake knowledge level and capacity of understanding, 4. Experience and Opinion, and 5. Deepfake vulnerability and management. The findings are presented below:

6.1 Profile of the respondents: A total of two hundred and four students of seven private and public universities participated in the survey. Among the universities three of them

were public and four of them were private. The three public universities are 1. Dhaka University, 2. Comilla University and 3. Barisal University. The private universities are 1. American International University- Bangladesh, 2. State University of Bangladesh, 3. Tagore University of Creative Arts, and 4. Bhuiyan Academy. All the respondents are undergrade level students. Among them, 66.7% are first year, 22.5% are second year, 7.4 % are third year, and 3.4% are fourth year students. 47% are from the Science and Engineering Faculty, 45% are from the Arts and Social Sciences Faculty and 8% of them are from the Business Faculty.

6.2 Source and type of deepfake contents: 75.5% of the students said they had heard about the term 'deepfake' before taking participation in the survey, 11.8% said they have never heard of the term, and 12.7% students were not sure whether they have heard about the term.

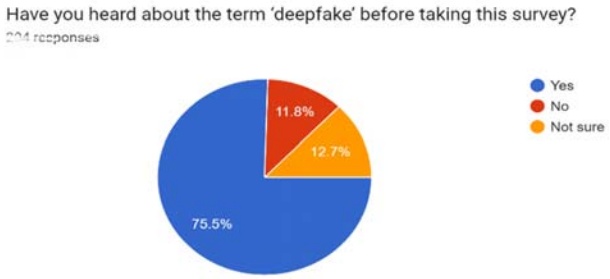

Figure: 3

Figure 4 illustrates the sources the students heard the term deepfake from. 58% of students heard the term from social media, 9% from news, 8% from classroom, 4% from cybersecurity or technology blogs/websites, 2% from entertainment Industry (movies, TV shows), only one percent mentioned advertising or marketing content, another one percent mentioned seminar/workshop and 2% of the students choose other source option. 12% of the students said they have never heard of the term.

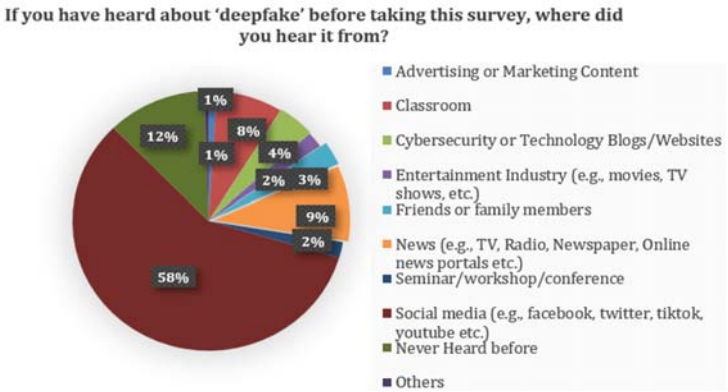

Figure: 4

Figure 5 shows the kind of deepfake contents students came across. 44% of students reported encountering deepfake videos, while 19% mentioned encountering deepfake images. A significant portion, 33%, were uncertain if they had encountered deepfake content before, indicating a lack of awareness or recognition of such material. Only 4% of respondents mentioned encountering deepfake audio. This data suggests that deepfake videos are the most encountered form of manipulated content among the surveyed students, followed by images, with audio being the least encountered.

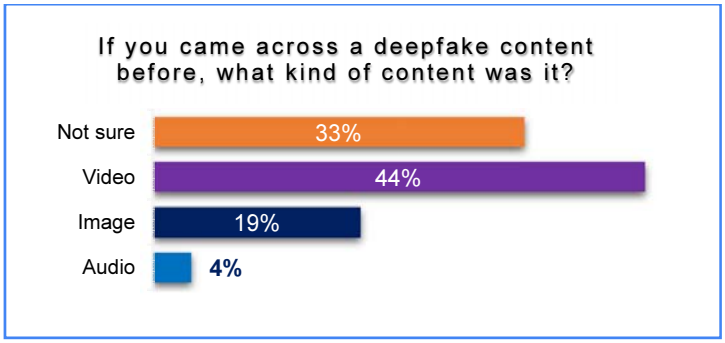

Figure: 5

6. 3 Deepfake knowledge level and capacity of understanding: According to the data in Figure 6, a significant portion of students are familiar with terms related to manipulated or synthesized media. The highest familiarity rates were observed for "Deepfake" at 67.6%, closely followed by "AI-generated media" at 66.7%. Additionally, terms like "Digitally altered picture or video" and "Face Swapping" also garnered notable recognition, with rates of 61.8% and 56.9% respectively. Meanwhile, terms such as "Cheapfake" and "Synthetic media" had lower familiarity rates, standing at 9.8% and 8.8% respectively.

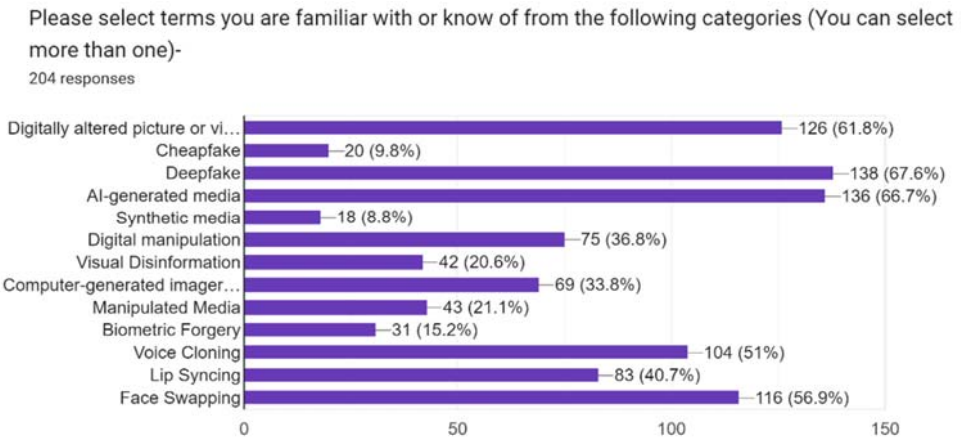

Figure: 6

Figure 7 depicts students' familiarity with deepfake technology, categorized into five levels of knowledge. Results show that 47% have only heard or read about deepfakes, 42% have watched/listened to deepfake videos/images/audios, 6% have received deepfakes from others, 1% have shared deepfakes with others, and 4% knows how deepfakes are generated.

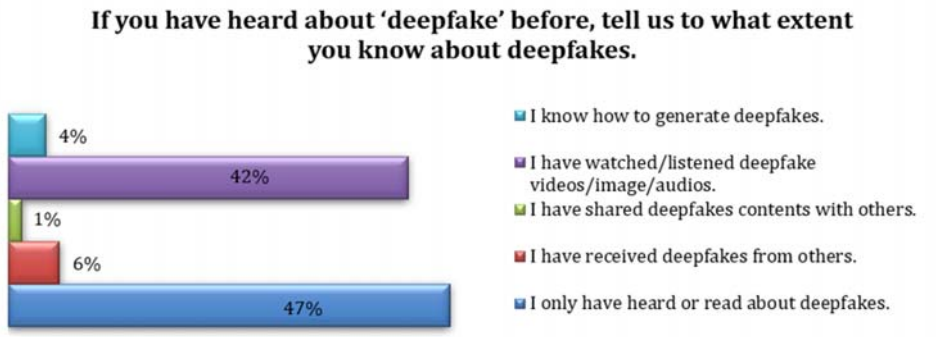

Figure: 7

Figure 8 demonstrates students' ability to identify deepfake contents. 58% of students claimed they could distinguish between deepfake and authentic content, while 23% admitted they could not, and 19% were unsure. This data suggests that a majority of students feel confident in their ability to discern between deepfake and genuine content. However, a significant portion still express uncertainty or lack of confidence in their ability to differentiate.

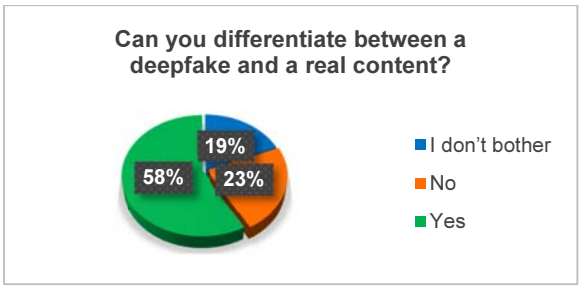

Figure: 8

Figure 9 illustrates The students were asked how confident do you feel in identifying deepfake contents? 37% lack confidence due to past deception, 42% doubt their abilities as technology advances, 9% feel proficient, while another 9% are highly confident based on past success. Only 2% remain constantly vigilant in detecting deepfakes.

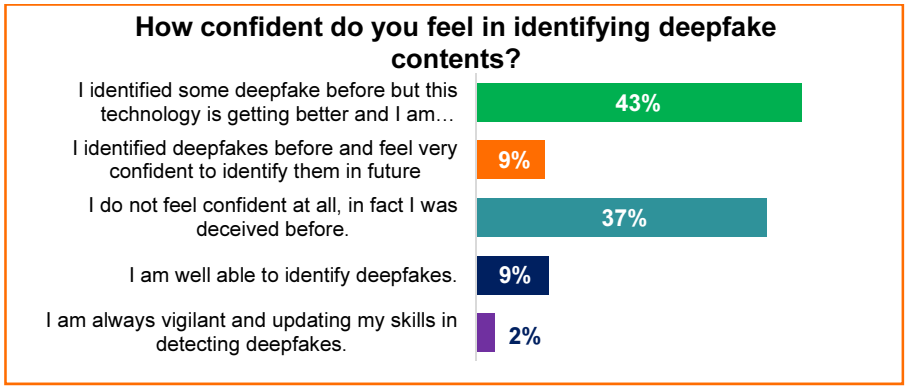

Figure: 9

6. 4. Experience and Opinion: Figure 10 presents various levels of exposure to deepfakes among students. While 41% are cognizant of deepfakes remain unaffected. 2% have encountered deepfakes of themselves and although the number is very low, it's a finding that among the 204 surveyed students were victim to deepfakes. Additionally, 17% have witnessed deepfakes of others, while a notable 31% claim to have never encountered deepfakes before. Approximately 8% preferred not to provide an answer.

Figure 10

Figure 11 illustrates the student's attitude towards deepfakes. They were asked how they see deepfake contents, 15% see said they like these contents but have concerns regarding its misuse, 40% said deepfakes create serious ethical issues and are a threat to privacy and security, 5% students do not see deepfake as problem, 33% see deepfakes as punishable criminal act and 7% said it's a form of entertainment.

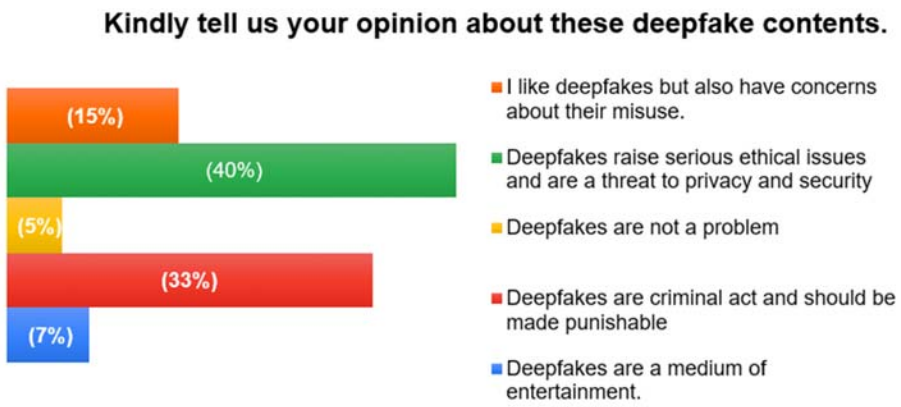

Figure 11

6.5 Deepfake vulnerability and management: Figure 12 shows the opinion of students on who are the most vulnerable. According to 40% of the students, celebrities are the most vulnerable group. 25% of students gave the opinion that anyone can be a victim to deepfake. 16% of responses thought teenagers were the most vulnerable. However, according to 25% of the students everyone in certain areas is vulnerable. Other groups, such as Academics and Researchers, Journalists and Media Professionals, and Political Figures, also contributed to the discourse, each receiving between 1% to 6% of the responses.

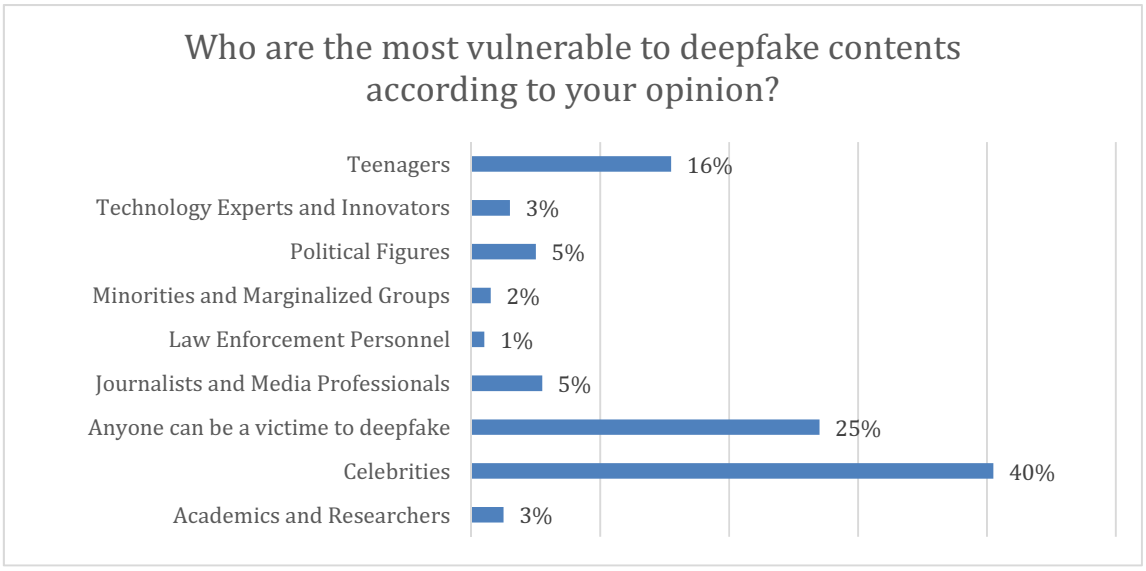

Figure 12

Figure 13 illustrates the students' opinion regarding managing deepfake. 21% think deepfake creation should be banned, 50% think government should take responsibility to protect people from deepfakes by updating laws, 5% think massive educational campaign is necessary, 5% think people should safeguard themselves and 20% of the students think technology should offer solutions to this problem.

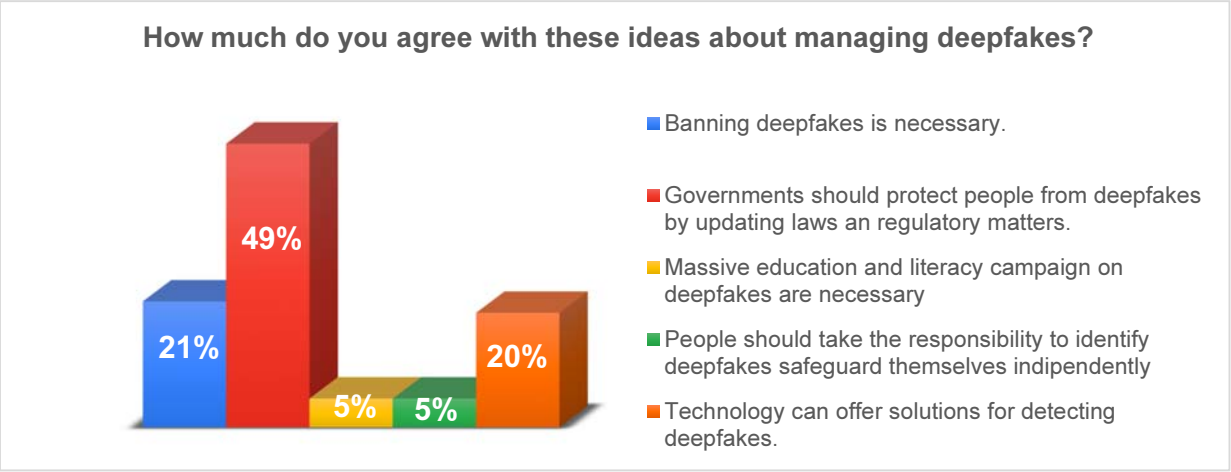

Figure 13

Figure 14 illustrates whether students have participated in any deepfake awareness program. 80% of the students said they never participated in any workshop of seminar on deepfake, and only 6% of students said they have participated in deepfake related seminar and 5% said they attended workshop on deepfake. 8% of students were unaware whether they participated in any workshop or seminar focused on deepfake and only 1% said they never even encountered any workshop or seminar This shows a huge media literacy gap regarding deepfake technology.

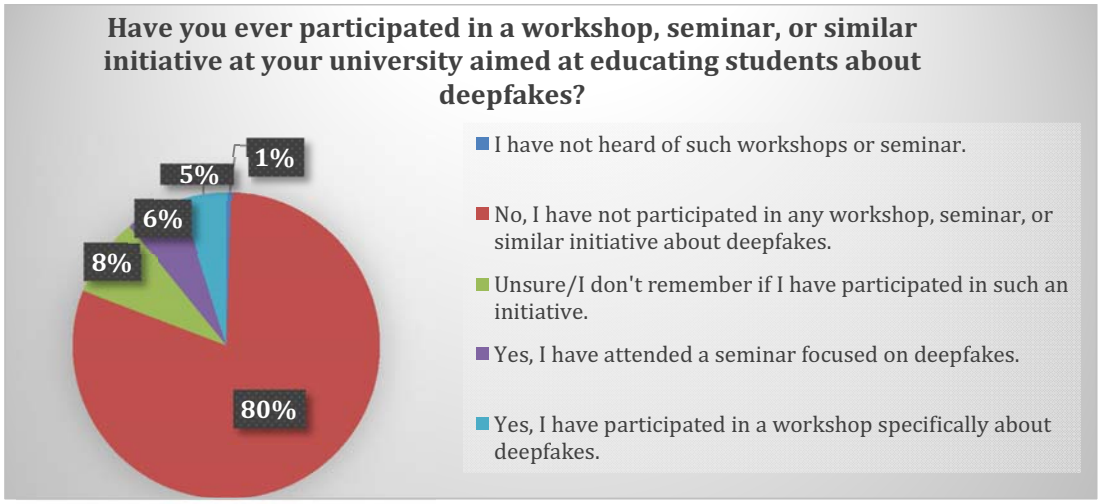

Figure 14

Figure 15 indicates that educational campaigns on deepfakes in schools, colleges, and universities are the most prominent strategy for combating deepfake technology, representing 36% of responses. This is closely followed by workshops and seminars on identifying deepfakes, which make up 16% of the responses. Utilizing social media platforms for awareness campaigns ranks third at 14%. Collaboration with influencers and

celebrities, as well as partnering with tech companies to develop anti-deepfake tools, each contribute 6%. Encouraging critical thinking skills and media literacy, along with integrating deepfake awareness into curriculum, each constitute 5% of the responses. Other strategies, such as collaborating with law enforcement agencies for educational programs and engaging parents and guardians in discussions and workshops, have relatively lower percentages. Additionally, a very small portion, which is 1% percent, advocated many of the strategies.

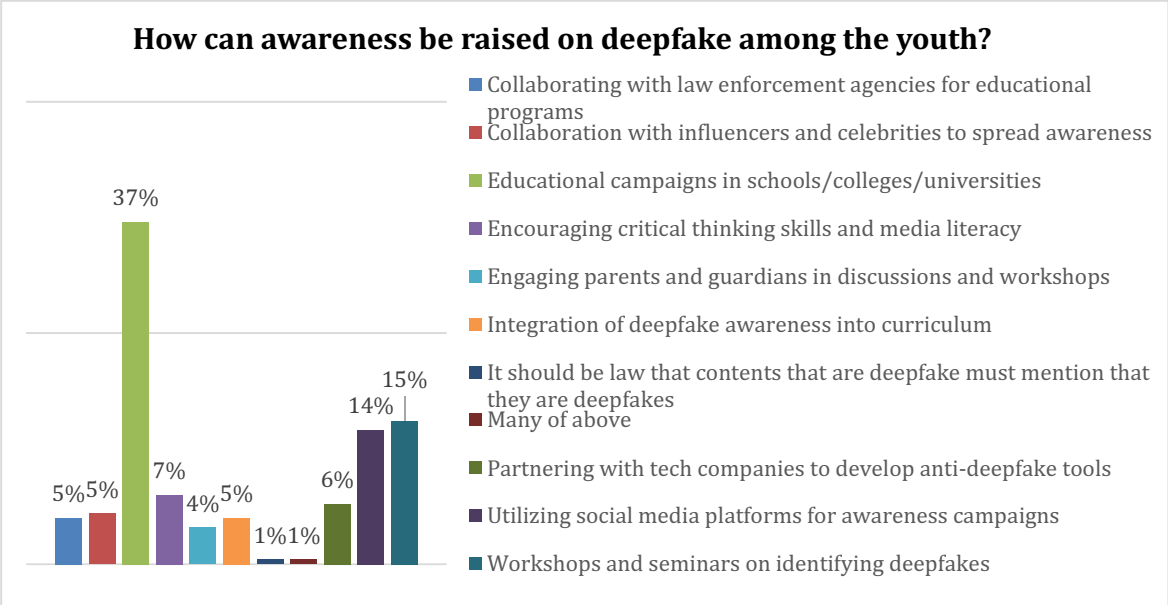

Figure 15

6. **Discussion:**

The survey data reveals compelling trends regarding undergraduate students' knowledge, awareness, attitudes, and management strategies concerning deepfake technology. Notably, a substantial majority (75.5%) of respondents had prior knowledge of the term "deepfake," indicating a considerable level of awareness among the student population. However, there remains a notable percentage (12%) who have never heard of deepfakes, suggesting the existence of a knowledge gap that requires addressing. Regarding the sources of information, social media emerges as the primary platform (58%) through which students encountered the term "deepfake," followed by news sources (9%) and educational settings like classrooms (8%). This distribution highlights the pervasive nature of deepfake content in online spaces and the importance of media literacy education to navigate such environments effectively. In terms of familiarity with deepfake technology, the data indicates varying levels of understanding among students. While a significant portion is

familiar with terms like "Deepfake" (67.6%) and "AI-generated media" (66.7%), fewer students recognize terms such as "Cheapfake" (9.8%) and "Synthetic media" (8.8%). Furthermore, a substantial percentage of students (58%) express confidence in their ability to distinguish between deepfake and authentic content. However, a significant proportion (23%) admit uncertainty or inability to identify deepfakes, reflecting the challenges associated with detecting increasingly sophisticated manipulations. In terms of attitudes, while a significant proportion (40%) recognizes deepfakes as posing serious ethical issues and threats to privacy and security, there are also segments of the student population that view deepfakes as a form of entertainment (7%) or remain indifferent to the problem (5%). This diversity of perspectives underscores the complexity of addressing deepfake-related challenges. Regarding vulnerability and management strategies, the data highlights celebrities as the perceived most vulnerable group to deepfake manipulation (40%), with government intervention (50%) and educational campaigns (5%) identified as key strategies for managing the risks associated with deepfake technology. However, participation in deepfake awareness programs remains low, with 80% of students reporting no prior involvement, indicating a need for increased educational initiatives to bridge the media literacy gap. In summary, while undergraduate students demonstrate varying levels of knowledge, awareness, attitudes, and management strategies concerning deepfake technology, the data underscores the importance of targeted education efforts, collaboration between stakeholders, and proactive measures to address the challenges posed by deepfakes effectively.

7. Conclusion:

This research has shed light on the levels of awareness, understanding, attitudes, and management strategies concerning deepfake technology among university students in Bangladesh, as guided by the research objectives. Regarding the awareness and understanding of deepfake technology, the data revealed a substantial level of awareness among students, with the majority having prior knowledge of the term "deepfake." However, a notable percentage remained unaware, indicating a knowledge gap that warrants attention. This underscores the importance of educational initiatives to bridge this gap and ensure a comprehensive understanding of deepfake technology among the student population.The findings indicated varying levels of familiarity with terminology related to deepfake technology, highlighting the need for further education on the subject. While a significant proportion of students expressed confidence in identifying deepfakes, a considerable percentage admitted uncertainty, emphasizing the challenges associated with detecting sophisticated manipulations. The data identified celebrities as the most

vulnerable group, next to it general people and teenagers as third vulnerable group, emphasizing the potential consequences of deepfake manipulation on individuals in the public eye. This insight can inform targeted interventions aimed at protecting vulnerable groups from the harmful effects of deepfake technology.The research also examined prevailing attitudes towards deepfake technology, including perceptions of its societal risks, and preferred strategies for addressing these challenges. The findings highlighted a diversity of perspectives, ranging from recognition of deepfakes as serious ethical issues to viewing them as forms of entertainment. This complexity underscores the need for multifaceted approaches to address the challenges posed by deepfakes effectively.

The findings of this study contribute to a deeper understanding of the awareness, understanding, attitudes, and management strategies concerning deepfake technology among university students in Bangladesh by reducing the eixisting gap in knowledge. However, the research only focused on a small portion of the population in Bangladesh who are university students. There is a scope for future research focusing on the diverse group of general publics.

References:

1. Aggarwal, A., Mittal, M., & Battineni, G. (2021). Generative adversarial network: An overview of theory and applications. International Journal of Information Management Data Insights, 1(1), 100004. https://doi.org/10.1016/j.jjimei.2020.100004
2. Ahmed, S. (2020). Who inadvertently shares deepfakes? Analyzing the role of political interest, cognitive ability, and social network size. Telematics and Informatics. https://doi.org/10.1016/j.tele.2020.101508
3. Akhtar, Z., Dasgupta, D., & Banerjee, B. (2019). Face Authenticity: An Overview of Face Manipulation Generation, Detection and Recognition. In Proceedings of the International Conference on Communication and Information Processing (ICCIP) (pp. 1–8). Talegaon Pune, India.
4. Alkiviadou, N. (2019). Hate speech on social media networks: towards a regulatory framework? Information & Communications Technology Law, 28(1), 19-35. DOI: 10.1080/13600834.2018.1494417
5. Bangladesh Bureau of Statistics (BBS) Census Report- https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2022-07-28-14-31-b21f81d1c15171f1770c661020381666.pdf
6. Byman, D., Meserole, C., & Subrahmanian, V. S. (2023, February 23). The Deepfake dangers ahead. The Wall Street Journal. https://www.wsj.com/articles/the-deepfake-dangers-ahead-b08e4ecf
7. Chesney, R., & Citron, D. K. (2019). Deep Fakes: A Looming Challenge for Privacy, Democracy, and National Security. California Law Review, 107, 1753. Retrieved from University of Texas Law, Public Law Research Paper No. 692; University of Maryland Legal Studies Research Paper No. 2018-21.
8. Combes, B. (2006). Techno savvy or techno oriented: Who are the net generation? Educational Media International, 43(4), 401-408.
9. Deepfake web- https://deepfakesweb.com/ (Accessed on 23 February 2024).
10. Face Swap Live- http://faceswaplive.com/ (Accessed on 23 February 2024).
11. FaceApp- https://www.faceapp.com/ (Accessed on 23 February 2024).
12. Fact Watch: https://www.fact-watch.org/web/this-video-is-a-deep-fake/?fbclid=IwAR3J7z9Qaflf0tUy-88nGWHrnLp32JUfI0oX0JWZWX_6KT5fsavlsTX-abg
13. Frankovits, G., & Mirsky, Y. (2023). Discussion Paper: The Threat of Real-Time Deepfakes. In Proceedings of the 2nd Workshop on Security Implications of

Deepfakes and Cheapfakes (WDC '23). Association for Computing Machinery. New York, NY, USA, 20–23. https://doi.org/10.1145/3595353.3595881

14. Gamage, D., Ghasiya, P., Bonagiri, V., Whiting, M., & Sasahara, K. (2022). Are Deepfakes Concerning? Analyzing Conversations of Deepfakes on Reddit and Exploring Societal Implications. 10.1145/3491102.3517446.
15. Hao, K. (2021, February 12). Deepfake porn is ruining women's lives. Now the law may finally ban it. MIT Technology Review. https://www.technologyreview.com/2021/02/12/1018222/deepfake-revenge-porn-coming-ban/ (Accessed on 23 February 2024)
16. Jin, X., Zhang, Z., Gao, B., Gao, S., Zhou, W., Yu, N., & Wang, G. (2023). Assessing the perceived credibility of deepfakes: The impact of system-generated cues and video characteristics. New Media & Society, 0(0). https://doi.org/10.1177/14614448231199664
17. Kleine, F. (2022). Perception of Deepfake Technology: The Influence of the Recipients' Affinity for Technology on the Perception of Deepfakes.
18. Maddocks, S. (2020). A Deepfake Porn Plot Intended to Silence Me: Exploring Continuities Between Pornographic and 'Political' Deep Fakes. Porn Studies, 7(4), 415–423.
19. Mirsky, Y., & Lee, W. (2021). The creation and detection of deepfakes: A survey. ACM Computing Surveys (CSUR), 54(1), 1–41.
20. Naffi, N., Charest, M., Danis, S., Pique, L., Davidson, A.-L., Brault, N., Bernard, M.-C., & Barma, S. (2023). Empowering Youth to Combat Malicious Deepfakes and Disinformation: An Experiential and Reflective Learning Experience Informed by Personal Construct Theory. Journal of Constructivist Psychology. Advance online publication. https://doi.org/10.1080/10720537.2023.2294314
21. Raj, Y. (2020, June 17). Obscuring the Lines of Truth: The Alarming Implications of Deepfakes. JURIST. https://www.jurist.org/commentary/2020/06/yash-raj-deepfakes/
22. Sayler, K. M., & Harris, L. A. (2020). Deep fakes and national security. Technical Report. Congressional Research SVC, Washington, United States.
23. Simonite, T. (2020, November 16). What Happened to the Deepfake Threat to the Election? Wired. https://www.wired.com/story/what-happened-deepfake-threat-election/
24. Smith, H., & Mansted, K. (2020, April 29). Weaponised deepfakes. Australian Strategic Policy Institute. https://www.aspi.org.au/report/weaponised-deep-fakes
25. The Daily Star: https://www.thedailystar.net/tech-startup/news/deepfake-video-targeting-gaibandha-1-candidate-surfaces-facebook-3513751

26. The Daily Star: https://www.thedailystar.net/news/bangladesh/elections/news/ai-disinformation-disrupting-bangladeshs-election-report-3494641
27. The New Age- https://www.newagebd.net/article/175839/849pc-youth-in-bangladesh-lack-basic-digital-skills-un#:~:text=About%2084.9%20per%20cent%20youth,UN%20report%20released%20on%20Thursday
28. Vaccari, C., & Chadwick, A. (2020). Deepfakes and Disinformation: Exploring the Impact of Synthetic Political Video on Deception, Uncertainty, and Trust in News. Social Media + Society, 6.
29. Vijayan, J. (2022). Reshaping the Threat Landscape: Deepfake Cyberattacks Are Here. Dark Reading. Retrieved from https://www.darkreading.com/threat-intelligence/threat-landscape-deepfake-cyberattacks-are-here (Accessed on December 15, 2022)
30. Watson, G., Khanjani, Z., & Janeja, V. P. (2021). Audio Deepfake Perceptions in College Going Populations. arXiv preprint arXiv:2112.03351.
31. World Economic Forum. (2024). Global Risk Report 2024. Retrieved from https://www.weforum.org/publications/global-risks-report-2024/digest/ (Accessed on 24 February 2024)
32. Witness. (2018, June 11). Mal-uses of AI-generated synthetic media and deepfakes: Pragmatic solutions discovery convening. Retrieved from http://witness.mediafire.com/file/q5juw7dc3a2w8p7/Deepfakes_Final.pdf
33. Young, J. (2021). Disinformation as the weaponization of cruel optimism: A critical intervention in misinformation studies. Emotion, Space and Society, 38, 100757. https://doi.org/10.1016/j.emospa.2020.100757